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EXAMINER	
CHOJNACKI, MELLISSA M	
ART UNIT	**PAPER NUMBER**
2164	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/729,939	JOSHI ET AL.	
	Examiner	Art Unit	
	MELLISSA M. CHOJNACKI	2164	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 April 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Remarks

1. In view of the Appeal Brief filed on April 18, 2008 PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

If an appellant wishes to reinstate an appeal after prosecution is reopened, appellant must file a new notice of appeal in compliance with 37 CFR 41.31and a complete new appeal brief in compliance with 37 CFR 41.37. Any previously paid appeal fees set forth in 37 CFR 41.20 for filing a notice of appeal, filing an appeal brief, and requesting an oral hearing (if applicable) will be applied to the new appeal on the same application as long as a final Board decision has not been made on the prior appeal. If, however, the appeal fees have increased since they were previously paid, then appellant must pay the difference between the current fee(s) and the amount previously paid. Appellant must file a complete new appeal brief in compliance with the format and content requirements of 37 CFR 41.37(c) within two months from the date of filing the new notice of appeal. See MPEP § 1205.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3, 8-14, 16-27, 29-34 and 36-37 rejected under 35 U.S.C. 103 (a) as being unpatentable over Sennott et al. (U.S. Patent No. 5,438,517), in view of Bargar et al. (U.S. Patent No. 6,009,394).

As to claim 1, Sennott et al. teaches a method for representing geographic features in a computer-based system (See abstract), comprising:

providing a first computer-usable database storing a plurality of data points specifying latitude and longitude coordinates of locations along at least one geographic feature (See column 49, lines 58-68; column 50, lines 1-57);

the data points specifying latitude and longitude coordinates to generate a plurality of control points for the polynomial spline (See column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

storing the control points in a second computer-usable database, the control points being usable for representing the geometry of the at least one geographic feature in the computer-based system (See column 29, lines 5-11 column 50, lines 5-57; column 51, lines 11-18).

Sennott et al. does not teach fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation.

Bargar et al. teaches a system and method for interfacing a 2D or 3D movement space to a high dimensional sound synthesis control space (See abstract), in which he teaches fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation (See column 6, lines 60-64).

Therefore, it would have been obvious to a person having ordinary skill in the art to use the teachings of applying a least squares approximation to a two-dimensional spline function as taught in Bargar et al. to Sennott et al.'s vehicle position determination system and method in order to link positions/data points smoothly for the polynomial spline (See Bargar et al., column 6, lines 56-64).

As to claim 2, Sennott et al. as modified, teaches wherein the data points are selected from the group consisting of coordinate pairs and coordinate triples (See Sennott et al., column 15, lines 27-37; column 41, lines 7-14; column 50, lines 5-15).

As to claim 3, Sennott et al. as modified, teaches configuring the number of control points (See Sennott et al., column 50, lines 5-57).

As to claims 8, 20, 24 and 30, Sennott et al. as modified, teaches incorporating in the least squares approximation a bearing value associated with a node included in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64); incorporating in the least squares approximation a bearing value associated with a node included in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines

31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64); wherein the spline control points are derived by incorporating in the least squares approximation a bearing value associated with a node included in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64); wherein the processor is configured to incorporate in the least squares approximation a bearing value associated with a node included in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64).

As to claims 9, 21, 25 and 31, Sennott et al. as modified, teaches weighting a node included in the plurality of data points in the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 5-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64); weighting a node included in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 5-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64); wherein the spline controls points are derived using the least squares approximation by weighting a node included, in the plurality of

data points (See Sennott et al., column 17, lines 47-55; column 50, lines 5-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64); wherein the processor is configured to weight a node included in the plurality of data points in the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 5-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64).

As to claims 10, 22, 26 and 32, Sennott et al. as modified, teaches employing regularization in computing the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64); employing regularization in the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64); wherein the spline control points are derived by employing regularization in the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64); wherein the processor is configured to employ

regularization in computing the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64).

As to claims 11, 17, 27 and 33, Sennott et al. as modified, teaches identifying a straight section of the at least one geographic feature (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Bargar et al., column 6, lines 56-64); and storing in the second computer-usable database the data points corresponding to the straight section (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Bargar et al., column 6, lines 56-644); identifying a straight section of a geographic feature based on the data points (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Bargar et al., column 6, lines 56-64); and storing in the computer-usable database the data points corresponding to the straight section of the geographic feature (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Bargar et al., column 6, lines 56-64); wherein the processor is configured to determine whether the geographic feature includes a straight section, and if so, linearly interpolate the data points representing the straight section (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50,

lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Bargar et al., column 6, lines 56-64); wherein the processor is configured to determine whether the at least one geographic feature has a substantially straight section, and if so, to store in the second computer-usable database the data points corresponding to the straight section (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Bargar et al., column 6, lines 56-64).

As to claims 12, 18 and 34, Sennott et al. as modified, teaches computing the control points only for one or more curved sections of the at least one geographic feature (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4); computing the control points only for one or more curved sections of the geographic feature (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4); wherein the processor computes the control points only for one or more curved sections of the at least one geographic feature (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4).

As to claim 13, Sennott et al. as modified, teaches computing the control points such that the tangent to the spline approximation of a curved section of the at least one

geographic feature and the tangent to the straight section are equal at the point at which the curved and straight section meet (See Sennott et al., column 67, lines 9-19).

As to claim 14, Sennott et al. teaches a method of displaying on a computer output device a function representing a geographic feature (See abstract), comprising:

retrieving from a computer-usable database a plurality of spline control points associated with the geographic feature (See column 49, lines 58-68; column 50, lines 1-57), a plurality of data points specifying latitude and longitude coordinates of locations along the geographic feature (See column 17, lines 47-55; column 21, lines 64-68; column 22, lines 1-3; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

calculating a polynomial spline using the spline control points to generate the function representing the geometry of the geographic feature (See column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55); and displaying the function on the computer output device (See column 29, lines 5-11 column 50, lines 5-57; column 51, lines 11-18).

Sennott et al. does not teach the spline control points being derived, using a least squares approximation.

Bargar et al. teaches a system and method for interfacing a 2D or 3D movement space to a high dimensional sound synthesis control space (See abstract), in which he

teaches the spline control points being derived, using a least squares approximation (See column 24, lines 35-44).

Therefore, it would have been obvious to a person having ordinary skill in the art to use the teachings of applying a least squares approximation to a two-dimensional spline function as taught in Bargar et al. to Sennott et al.'s vehicle position determination system and method in order to link positions/data points smoothly for the polynomial spline (See Bargar et al., column 6, lines 56-64).

As to claim 16, Sennott et al. teaches a method of generating a computer-usable database that represents feature geometry using a plurality of spline control points associated with a plurality of geographic features (See abstract), comprising:

providing a predetermined database that represents feature geometry using a plurality of data points specifying latitude and longitude coordinates of locations along the geographic features (See column 21, lines 64-68; column 22, lines 1-3; column 49, lines 58-68; column 50, lines 1-57);

for each of the geographic features, retrieving a corresponding set of data points specifying latitude and longitude coordinates from the predetermined database (See column 21, lines 64-68; column 22, lines 1-3); and

fitting a polynomial spline to each of the geographic features by computing the corresponding set of data points specifying latitude and longitude coordinates (See column 17, lines 47-55; column 21, lines 64-68; column 22, lines 1-3; column 50, lines

58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

storing the plurality of spline control points in the computer-usable database (See column 29, lines 5-11 column 50, lines 5-57; column 51, lines 11-18).

Sennott et al. does not teach plurality of control points yielding the least squares approximation.

Bargar et al. teaches a system and method for interfacing a 2D or 3D movement space to a high dimensional sound synthesis control space (See abstract), in which he teaches plurality of control points yielding the least squares approximation (See column 24, lines 35-44).

Therefore, it would have been obvious to a person having ordinary skill in the art to use the teachings of applying a least squares approximation to a two-dimensional spline function as taught in Bargar et al. to Sennott et al.'s vehicle position determination system and method in order to link positions/data points smoothly for the polynomial spline (See Bargar et al., column 6, lines 56-64).

As to claim 19, Sennott et al. as modified, teaches computing the control points for a geographic feature that has a curved section and an adjoining straight section such that a bearing value at an endpoint of the curved section equals a corresponding bearing value at an endpoint of the straight section that meets the curved section (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4).

As to claim 23, Sennott et al. teaches a system for displaying a function representing the geometry of a geographic feature (See abstract), comprising:

a database storing one or more spline control points associated with the geographic feature (See column 21, lines 64-68; column 22, lines 1-3; column 49, lines 58-68; column 50, lines 1-57), from a plurality of data points specifying latitude and longitude coordinates of locations along the geographic feature (See column 17, lines 47-55; column 21, lines 64-68; column 22, lines 1-3; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

a processor configured to compute a polynomial spline using the spline control points to generate the function representing the geometry of the geographic feature (See column 17, lines 18-28, lines 47-55; column 21, lines 64-68; column 22, lines 1-3; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

and a display device for displaying the polyline (See column 29, lines 5-11 column 50, lines 5-57; column 51, lines 11-18).

Sennott et al. does not teach the spline control points being derived, using a least squares approximation.

Bargar et al. teaches a system and method for interfacing a 2D or 3D movement space to a high dimensional sound synthesis control space (See abstract), in which he

teaches the spline control points being derived, using a least squares approximation (See column 24, lines 35-44).

Therefore, it would have been obvious to a person having ordinary skill in the art to use the teachings of applying a least squares approximation to a two-dimensional spline function as taught in Bargar et al. to Sennott et al.'s vehicle position determination system and method in order to link positions/data points smoothly for the polynomial spline (See Bargar et al., column 6, lines 56-64).

As to claim 29, Sennott et al. teaches a system for generating a plurality of spline control points that represent feature geometry (See abstract), comprising:

a first computer-usable database for storing a plurality of data points specifying latitude and longitude coordinates of locations along at least one geographic feature (See column 21, lines 64-68; column 22, lines 1-3; column 49, lines 58-68; column 50, lines 1-57); and

a processor configured to the data points specifying latitude and longitude coordinates to generate the plurality of control points for a polynomial spline (See column 17, lines 47-55; column 21, lines 64-68; column 22, lines 1-3; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

a second computer-usable database for storing the control points (See column 29, lines 5-11 column 50, lines 5-57; column 51, lines 11-18).

Sennott et al. does not teach apply a least squares approximation.

Bargar et al. teaches a system and method for interfacing a 2D or 3D movement space to a high dimensional sound synthesis control space (See abstract), in which he teaches apply a least squares approximation (See column 24, lines 35-44).

Therefore, it would have been obvious to a person having ordinary skill in the art to use the teachings of applying a least squares approximation to a two-dimensional spline function as taught in Bargar et al. to Sennott et al.'s vehicle position determination system and method in order to link positions/data points smoothly for the polynomial spline (See Bargar et al., column 6, lines 56-64).

As to claim 36, Sennott et al. as modified, teaches wherein the geographic feature is a road (See Sennott et al., column 50, lines 45-52).

As to claim 37, Sennott et al. as modified, teaches wherein the data points further specifying altitude (See Sennott et al., column 21, lines 64-68; column 22, lines 1-3; column 29, lines 45-52).

4. Claims 4, 15, 28 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sennott et al. (U.S. Patent No. 5,438,517) in view of Bargar et al. (U.S. Patent No. 6,009,394), in further view of Dayanand et al. (U.S. Patent No. 6,639,592).

As to claim 4, Sennott et al. still does not teach wherein the polynomial spline is selected from the group consisting of uniform non-rational B-spline, non-uniform non-

rational B-spline, uniform Catmull-Rom spline, non-uniform Catmull-Rom spline, and NURBS.

Dayanand et al. teaches curve network modeling (See abstract), in which he teaches wherein the polynomial spline is selected from the group consisting of uniform non-rational B-spline, non-uniform non-rational B-spline, uniform Catmull-Rom spline, non-uniform Catmull-Rom spline, and NURBS (See abstract; column 2, lines 27-29; column 4, lines 20-29).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have modified Sennott et al., to include wherein the polynomial spline is selected from the group consisting of uniform non-rational B-spline, non-uniform non-rational B-spline, uniform Catmull-Rom spline, non-uniform Catmull-Rom spline, and NURBS.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Sennott et al., by the teachings of Dayanand et al. because wherein the polynomial spline is selected from the group consisting of uniform non-rational B-spline, non-uniform non-rational B-spline, uniform Catmull-Rom spline, non-uniform Catmull-Rom spline, and NURBS would enable a computer modeler to represent arbitrary curved surfaces very accurately (See Dayanand et al., column 1, lines 44-52).

As to claims 15, 28 and 35, Sennott et al. as modified, teaches wherein the polynomial spline is selected from the group consisting of uniform nonrational B-spline,

non-uniform nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS (See Dayanand et al., abstract; column 2, lines 27-29; column 4, lines 20-29); wherein the polynomial spline is selected from the group consisting of uniform nonrational B-spline, non-uniform nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS (See Dayanand et al., abstract; column 2, lines 27-29; column 4, lines 20-29); wherein the polynomial spline is selected from the group consisting of a uniform nonrational B-spline, nonuniform nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS (See Dayanand et al., abstract; column 2, lines 27-29; column 4, lines 20-29).

5. Claims 5-7 rejected under 35 U.S.C. 103(a) as being unpatentable over Sennott et al. (U.S. Patent No. 5,438,517) in view Bargar et al. (U.S. Patent No. 6,009,394), in further view of Rohm et al. (U.S. Patent No. 6,253,164)

As to claim 5, Sennott et al., still does not teach defining a knot sequence for the polynomial spline.

Rohm et al. teaches curves and surfaces modeling based on a cloud of points (See abstract), in which he teaches defining a knot sequence for the polynomial spline (See column 4, lines 17-21).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have modified Sennott et al., to include defining a knot sequence for the polynomial spline.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Sennott et al., by the teachings of Rohm et al. because defining a knot sequence for the polynomial spline would allow the modeler to only capture spatial information and the system will generate all surfaces automatically (See Rohm et al., column 2, lines 32-34).

As to claim 6, Sennott et al. as modified, teaches manually defining the knot sequence (See Rohm et al., column 4, lines 17-33).

As to claim 7, Sennott et al. as modified, teaches storing the knot sequence in the second computer-usable database (See Rohm et al., column 4, lines 17-33).

6. Claims 1-3, 8-14, 16-27, 29-34 and 36-37 rejected under 35 U.S.C. 103 (a) as being unpatentable over Sennott et al. (U.S. Patent No. 5,438,517), in view of Eberwiner et al. (U.S. Patent No. 6,133,867).

As to claim 1, Sennott et al. teaches a method for representing geographic features in a computer-based system (See abstract), comprising:

providing a first computer-usable database storing a plurality of data points specifying latitude and longitude coordinates of locations along at least one geographic feature (See column 49, lines 58-68; column 50, lines 1-57);

the data points specifying latitude and longitude coordinates to generate a plurality of control points for the polynomial spline (See column 17, lines 47-55; column

50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

storing the control points in a second computer-usable database, the control points being usable for representing the geometry of the at least one geographic feature in the computer-based system (See column 29, lines 5-11 column 50, lines 5-57; column 51, lines 11-18).

Sennott et al. does not teach fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation.

Eberwiner et al. teaches a Integrated air traffic management and collision avoidance system (See abstract), in which he teaches fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation (See column 10, lines 1-21; column 14, lines 50-57).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have modified to Sennott et al., to include fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified to Sennott et al., by the teachings of Eberwiner et al. because fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation would prevent craft-to-craft collisions and craft-to-stationery objects collisions and to prevent aircraft to ground or terrain collisions (See Eberwiner et al., column 1, lines 11-22).

As to claim 2, Sennott et al. as modified, teaches wherein the data points are selected from the group consisting of coordinate pairs and coordinate triples (See Sennott et al., column 15, lines 27-37; column 41, lines 7-14; column 50, lines 5-15).

As to claim 3, Sennott et al. as modified, teaches configuring the number of control points (See Sennott et al., column 50, lines 5-57).

As to claims 8, 20, 24 and 30, Sennott et al. as modified, teaches incorporating in the least squares approximation a bearing value associated with a node included in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57); incorporating in the least squares approximation a bearing value associated with a node included in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also See Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57); wherein the spline control points are derived by incorporating in the least squares approximation a bearing value associated with a node included in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines

6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57); wherein the processor is configured to incorporate in the least squares approximation a bearing value associated with a node included in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57).

As to claims 9, 21, 25 and 31, Sennott et al. as modified, teaches weighting a node included in the plurality of data points in the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 5-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57); weighting a node included in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 5-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57); wherein the spline controls points are derived using the least squares approximation by weighting a node included, in the plurality of data points (See Sennott et al., column 17, lines 47-55; column 50, lines 5-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines

31-34, lines 47-55; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57); wherein the processor is configured to weight a node included in the plurality of data points in the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 5-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57).

As to claims 10, 22, 26 and 32, Sennott et al. as modified, teaches employing regularization in computing the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Bargar et al., column 6, lines 56-64); employing regularization in the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57); wherein the spline control points are derived by employing regularization in the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57); wherein the processor is configured to employ regularization in computing the least squares approximation (See Sennott et al., column 17, lines 47-55; column 50,

lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57).

As to claims 11, 17, 27 and 33, Sennott et al. as modified, teaches identifying a straight section of the at least one geographic feature (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57) and storing in the second computer-usable database the data points corresponding to the straight section (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57); identifying a straight section of a geographic feature based on the data points (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Bargar et al., column 6, lines 56-64); and storing in the computer-usable database the data points corresponding to the straight section of the geographic feature (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57); wherein the processor is configured to determine whether the geographic feature includes a straight section, and if so, linearly interpolate the data points representing the straight section (See Sennott et al., column 46, lines 21-30;

column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57) wherein the processor is configured to determine whether the at least one geographic feature has a substantially straight section, and if so, to store in the second computer-usable database the data points corresponding to the straight section (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4; Also see Eberwiner et al., column 10, lines 1-21; column 14, lines 50-57).

As to claims 12, 18 and 34, Sennott et al. as modified, teaches computing the control points only for one or more curved sections of the at least one geographic feature (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4); computing the control points only for one or more curved sections of the geographic feature (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4); wherein the processor computes the control points only for one or more curved sections of the at least one geographic feature (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4).

As to claim 13, Sennott et al. as modified, teaches computing the control points such that the tangent to the spline approximation of a curved section of the at least one

geographic feature and the tangent to the straight section are equal at the point at which the curved and straight section meet (See Sennott et al., column 67, lines 9-19).

As to claim 14, Sennott et al. teaches a method of displaying on a computer output device a function representing a geographic feature (See abstract), comprising:

retrieving from a computer-usable database a plurality of spline control points associated with the geographic feature (See column 49, lines 58-68; column 50, lines 1-57), a plurality of data points specifying latitude and longitude coordinates of locations along the geographic feature (See column 17, lines 47-55; column 21, lines 64-68; column 22, lines 1-3; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

calculating a polynomial spline using the spline control points to generate the function representing the geometry of the geographic feature (See column 17, lines 47-55; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55); and displaying the function on the computer output device (See column 29, lines 5-11 column 50, lines 5-57; column 51, lines 11-18).

Sennott et al. does not teach the spline control points being derived, using a least squares approximation.

Eberwiner et al. teaches a Integrated air traffic management and collision avoidance system (See abstract), in which he teaches fitting a polynomial spline to the

at least one geographic feature by applying a least squares approximation (See column 10, lines 1-21; column 14, lines 50-57).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have modified to Sennott et al., to include fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified to Sennott et al., by the teachings of Eberwiner et al. because fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation would prevent craft-to-craft collisions and craft-to-stationery objects collisions and to prevent aircraft to ground or terrain collisions (See Eberwiner et al., column 1, lines 11-22).

As to claim 16, Sennott et al. teaches a method of generating a computer-usable database that represents feature geometry using a plurality of spline control points associated with a plurality of geographic features (See abstract), comprising:

providing a predetermined database that represents feature geometry using a plurality of data points specifying latitude and longitude coordinates of locations along the geographic features (See column 21, lines 64-68; column 22, lines 1-3; column 49, lines 58-68; column 50, lines 1-57);

for each of the geographic features, retrieving a corresponding set of data points specifying latitude and longitude coordinates from the predetermined database (See column 21, lines 64-68; column 22, lines 1-3); and

fitting a polynomial spline to each of the geographic features by computing the corresponding set of data points specifying latitude and longitude coordinates (See column 17, lines 47-55; column 21, lines 64-68; column 22, lines 1-3; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

storing the plurality of spline control points in the computer-usable database (See column 29, lines 5-11 column 50, lines 5-57; column 51, lines 11-18).

Sennott et al. does not teach plurality of control points yielding the least squares approximation.

Eberwiner et al. teaches a Integrated air traffic management and collision avoidance system (See abstract), in which he teaches fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation (See column 10, lines 1-21; column 14, lines 50-57).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have modified to Sennott et al., to include fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified to Sennott et al., by the teachings of

Eberwiner et al. because fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation would prevent craft-to-craft collisions and craft-to-stationery objects collisions and to prevent aircraft to ground or terrain collisions (See Eberwiner et al., column 1, lines 11-22).

As to claim 19, Sennott et al. as modified, teaches computing the control points for a geographic feature that has a curved section and an adjoining straight section such that a bearing value at an endpoint of the curved section equals a corresponding bearing value at an endpoint of the straight section that meets the curved section (See Sennott et al., column 46, lines 21-30; column 51, lines 39-50, lines 65-68; column 52, lines 1-5; column 54, lines 67-68; column 55, lines 1-4).

As to claim 23, Sennott et al. teaches a system for displaying a function representing the geometry of a geographic feature (See abstract), comprising:

a database storing one or more spline control points associated with the geographic feature (See column 21, lines 64-68; column 22, lines 1-3; column 49, lines 58-68; column 50, lines 1-57), from a plurality of data points specifying latitude and longitude coordinates of locations along the geographic feature (See column 17, lines 47-55; column 21, lines 64-68; column 22, lines 1-3; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

a processor configured to compute a polynomial spline using the spline control points to generate the function representing the geometry of the geographic feature (See column 17, lines 18-28, lines 47-55; column 21, lines 64-68; column 22, lines 1-3; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

and a display device for displaying the polyline (See column 29, lines 5-11 column 50, lines 5-57; column 51, lines 11-18).

Sennott et al. does not teach the spline control points being derived, using a least squares approximation.

Eberwiner et al. teaches a Integrated air traffic management and collision avoidance system (See abstract), in which he teaches fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation (See column 10, lines 1-21; column 14, lines 50-57).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have modified to Sennott et al., to include fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified to Sennott et al., by the teachings of Eberwiner et al. because fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation would prevent craft-to-craft collisions and craft-to-stationery objects collisions and to prevent aircraft to ground or

terrain collisions (See Eberwiner et al., column 1, lines 11-22).

As to claim 29, Sennott et al. teaches a system for generating a plurality of spline control points that represent feature geometry (See abstract), comprising:

a first computer-usable database for storing a plurality of data points specifying latitude and longitude coordinates of locations along at least one geographic feature (See column 21, lines 64-68; column 22, lines 1-3; column 49, lines 58-68; column 50, lines 1-57); and

a processor configured to the data points specifying latitude and longitude coordinates to generate the plurality of control points for a polynomial spline (See column 17, lines 47-55; column 21, lines 64-68; column 22, lines 1-3; column 50, lines 58-66; column 51, lines 65-68; column 52, lines 1-5; column 56, lines 6-27; column 71, lines 15-20, lines 36-41; column 72, lines 31-34, lines 47-55);

a second computer-usable database for storing the control points (See column 29, lines 5-11 column 50, lines 5-57; column 51, lines 11-18).

Sennott et al. does not teach apply a least squares approximation.

Eberwiner et al. teaches a Integrated air traffic management and collision avoidance system (See abstract), in which he teaches fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation (See column 10, lines 1-21; column 14, lines 50-57).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have modified to Sennott et al., to include fitting

a polynomial spline to the at least one geographic feature by applying a least squares approximation.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified to Sennott et al., by the teachings of Eberwiner et al. because fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation would prevent craft-to-craft collisions and craft-to-stationery objects collisions and to prevent aircraft to ground or terrain collisions (See Eberwiner et al., column 1, lines 11-22).

As to claim 36, Sennott et al. as modified, teaches wherein the geographic feature is a road (See Sennott et al., column 50, lines 45-52).

As to claim 37, Sennott et al. as modified, teaches wherein the data points further specifying altitude (See Sennott et al., column 21, lines 64-68; column 22, lines 1-3; column 29, lines 45-52).

7. Claims 4, 15, 28 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sennott et al. (U.S. Patent No. 5,438,517) in view of Eberwiner et al. (U.S. Patent No. 6,133,867), in further view of Dayanand et al. (U.S. Patent No. 6,639,592).

As to claim 4, Sennott et al. as modified, still does not teach wherein the polynomial spline is selected from the group consisting of uniform non-rational B-spline,

non-uniform non-rational B-spline, uniform Catmull-Rom spline, non-uniform Catmull-Rom spline, and NURBS.

Dayanand et al. teaches curve network modeling (See abstract), in which he teaches wherein the polynomial spline is selected from the group consisting of uniform non-rational B-spline, non-uniform non-rational B-spline, uniform Catmull-Rom spline, non-uniform Catmull-Rom spline, and NURBS (See abstract; column 2, lines 27-29; column 4, lines 20-29).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have modified Sennott et al. as modified, to include wherein the polynomial spline is selected from the group consisting of uniform non-rational B-spline, non-uniform non-rational B-spline, uniform Catmull-Rom spline, non-uniform Catmull-Rom spline, and NURBS.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Sennott et al. as modified, by the teachings of Dayanand et al. because wherein the polynomial spline is selected from the group consisting of uniform non-rational B-spline, non-uniform non-rational B-spline, uniform Catmull-Rom spline, non-uniform Catmull-Rom spline, and NURBS would enable a computer modeler to represent arbitrary curved surfaces very accurately (See Dayanand et al., column 1, lines 44-52).

As to claims 15, 28 and 35, Sennott et al. as modified, teaches wherein the polynomial spline is selected from the group consisting of uniform nonrational B-spline,

non-uniform nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS (See Dayanand et al., abstract; column 2, lines 27-29; column 4, lines 20-29); wherein the polynomial spline is selected from the group consisting of uniform nonrational B-spline, non-uniform nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS (See Dayanand et al., abstract; column 2, lines 27-29; column 4, lines 20-29); wherein the polynomial spline is selected from the group consisting of a uniform nonrational B-spline, nonuniform nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS (See Dayanand et al., abstract; column 2, lines 27-29; column 4, lines 20-29).

8. Claims 5-7 rejected under 35 U.S.C. 103(a) as being unpatentable over Sennott et al. (U.S. Patent No. 5,438,517) in view Eberwiner et al. (U.S. Patent No. 6,133,867), in further view of Rohm et al. (U.S. Patent No. 6,253,164)

As to claim 5, Sennott et al. as modified, still does not teach defining a knot sequence for the polynomial spline.

Rohm et al. teaches curves and surfaces modeling based on a cloud of points (See abstract), in which he teaches defining a knot sequence for the polynomial spline (See column 4, lines 17-21).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have modified Sennott et al. as modified, to include defining a knot sequence for the polynomial spline.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Sennott et al. as modified, by the teachings of Rohm et al. because defining a knot sequence for the polynomial spline would allow the modeler to only capture spatial information and the system will generate all surfaces automatically (See Rohm et al., column 2, lines 32-34).

As to claim 6, Sennott et al. as modified, teaches manually defining the knot sequence (See Rohm et al., column 4, lines 17-33).

As to claim 7, Sennott et al. as modified, teaches storing the knot sequence in the second computer-usable database (See Rohm et al., column 4, lines 17-33).

Response to Arguments

9. Applicant's arguments filed on April 4, 2008, with respect to the rejected claims in view of the cited references have been considered and the examiner has maintained her previous rejected however, the examiner has disclosed a new rejection replacing the secondary reference in order to show that fitting a polynomial spline in a navigation system that pertains to the curvatures in road (geographical feature) is common in the art.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MELLISSA M. CHOJNACKI whose telephone number is (571)272-4076. The examiner can normally be reached on 9:00am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Rones can be reached on (571) 272-4085. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

July 2, 2008
Mmc

/Charles Rones/
Supervisory Patent Examiner, Art Unit 2164